CLAIMS

1. In a wireless communications network, a method for adaptively modifying the sleep-mode behavior of a mobile station, the method comprising:

maintaining a record of traffic communications to a mobile station;

in response to the traffic communications record, determining cyclic patterns of traffic communication activity; and

reducing control communications with the wireless communications network during periods determined to have low traffic communication activity.

2. The method of claim 1 in which the wireless communications network includes a base station to transmit broadcast messages monitored by the mobile station; and

wherein reducing control communications with the wireless system during periods determined to have low traffic communication activity includes the first mobile station reducing the monitoring of base station broadcast messages.

3. The method of claim 2 in which control communications between the base station and the mobile station include a slotted mode of operation where the mobile station monitors broadcast messages from the base station transmitted at a first periodic rate; and

wherein reducing control communications with the wireless system during periods determined to have low traffic communication

activity includes the first mobile station operating in a deep-sleep slotted mode where the mobile station monitors broadcast messages from the base station transmitted at a second periodic rate, slower than the first rate.

4. The method of claim 3 wherein maintaining a record of communications includes making a record of traffic communications to the first mobile station over a period of time greater than a day; and

wherein determining cyclic patterns of traffic communication activity includes determining daily patterns of traffic communication activity.

5. The method of claim 4 wherein determining cyclic patterns of traffic communication activity includes:

differentiating times within a daily cycle; and

averaging the traffic communication activity occurring at the differentiated times.

6. The method of claim 5 wherein determining cyclic patterns of traffic communication activity includes:

weighting traffic communication activity occurring in recent cycles more heavily than traffic communication activity occurring in less recent cycles.

7. The method of claim 5 wherein determining cyclic patterns of traffic communication activity includes calculating the deep-sleep slotted mode second period; and

the method further comprising:

requesting from the base station, a deep-sleep slotted mode of operation having the second period;

receiving permission to operate in the deep-sleep mode of operation having the second period; and

wherein operating in a deep-sleep slotted mode at the second rate includes operating at the second rate in response to receiving permission.

8. The method of claim 7 in which the mobile station includes a memory, a microprocessor, and a stored software application of machine executable instructions; and

wherein maintaining a record of traffic communication activities includes monitoring and storing a traffic communications record in the memory of the mobile station; and

wherein determining the patterns of traffic communication activity includes using the software application to access the record stored in memory to calculate patterns of traffic communication activity and the deep-sleep mode second rate.

9. The method of claim 6 in which the mobile station includes a memory and in which the base station includes a memory, a

microprocessor, and a software application of machine executable instructions;

wherein maintaining a record of traffic communication activities includes monitoring and storing a traffic communications record in the memory of the mobile station; and

the method further comprising:

transmitting the record of traffic communication activities to the base station memory; and

wherein determining the patterns of traffic communication activity includes using the base station software application to access the record stored in the base station memory to calculate patterns of traffic communication activity and the deep-sleep mode second rate.

10. The method of claim 9 further comprising:

the base station transmitting a command for the mobile station to operate in the deep-sleep slotted mode of operation having the second period; and

wherein operating in a deep-sleep slotted mode at the second rate includes the mobile station operating at the second rate in response to receiving the command.

11. The method of claim 6 in which the base station includes a memory, a microprocessor, and a software application of machine executable instructions;

wherein maintaining a record of traffic communication activities includes monitoring and storing a traffic communications record in the memory of the base station; and

wherein determining the patterns of traffic communication activity includes using the base station software application to access the record stored in memory to calculate patterns of traffic communication activity and the deep-sleep mode second rate.

12. The method of claim 11 further comprising:

the base station transmitting a command for the mobile station to operate in the deep-sleep slotted mode of operation having the second period; and

wherein operating in a deep-sleep slotted mode at the second rate includes the mobile station operating at the second rate in response to receiving the command.

13. The method of claim 6 wherein reducing control communications with the wireless communications network during periods determined to have low traffic communication activity includes the first mobile station operating in a deep-sleep slotted mode where the mobile station monitors broadcast messages from the base station transmitted at a second, variable, periodic rate, slower than the first rate.

14. The method of claim 13 wherein the second rate at which the deep-sleep mode operates is varied in response to the average

traffic communication activity occurring at a differentiated time in the cycle.

15. The method of claim 1 in which the mobile station includes a battery; and

the method further comprising:

detecting the condition of the mobile station battery; and

reducing control communications with the wireless communications network during in response to the condition of the mobile station battery.

16. The method of claim 1 in which a base station message service is included; and

the method further comprising:

following the reducing of the control communications with the wireless communications network, initiating a mobile station traffic communication;

supplying a warning from the base station message service that the initiation of the traffic communication with the mobile station will be delayed.

17. In a wireless communications network, a system for adaptively modifying the sleep-mode behavior of a mobile station, the system comprising:

a mobile station having a wireless communications port to communicate traffic and control communications with the wireless communications network;

an interacting memory, microprocessor, and software application of machine executable instructions to maintain a record of mobile station traffic communications and, in response to the traffic communications record, determining cyclic patterns of traffic communication activity; and

wherein control communications are reduced between the mobile station and the wireless communications network during periods determined to have low traffic communication activity.

18. The system of claim 17 further comprising:

a base station to transmit broadcast messages monitored by the mobile station, the base station decreasing the frequency of transmitted broadcast messages when control communications between the wireless communications network and the mobile station are reduced.

19. The system of claim 18 wherein base station control communication to the mobile station include a slotted mode of operation;

wherein the mobile station monitors broadcast messages from the base station transmitted at a first periodic rate in the slotted mode of operation;

wherein the base station control communications include a deep-sleep slotted mode of operation to reduce control communications to the mobile station; and

wherein the mobile station monitors broadcast messages from the base station at a second periodic rate, less than the first rate in the deep-sleep mode of operation.

20. The system of claim 19 wherein the memory maintains a record of communications which include a record of traffic communications to the first mobile station over a period of time greater than a day; and

wherein the software application determines daily patterns of traffic communication activity from the stored record of traffic communications.

21. The system of claim 20 wherein the software application cooperates with the record of traffic communications in memory to differentiating times within a daily cycle and to average the traffic communication activity occurring at the differentiated times.

22. The system of claim 21 wherein the software application cooperates with the record of traffic communications stored in memory to weight traffic communication activity occurring in recent cycles more heavily than traffic communication activity occurring in less recent cycles.

23. The system of claim 21 wherein the software application cooperates with the record of traffic communications stored in memory to calculate the deep-sleep slotted mode second period; and

wherein the base station receives a request asking permission for the mobile station to operate in deep-sleep slotted mode of operation having the second period;

wherein the mobile station receives a command from the base station to operate in the deep-sleep mode of operation having the second period.

24. The system of claim 23 wherein the memory, microprocessor, and software application are co-located with the mobile station, and wherein the patterns of traffic communication are determined at the mobile station.

25. The system of claim 22 wherein the memory, microprocessor, and software application are co-located with the base station, and wherein the base station determines the patterns of traffic communication activity.

26. The system of claim 25 wherein the mobile station includes a local memory to maintain a record of traffic communication activities which are transmitted to the base station memory.

27. The system of claim 19 wherein the base station control communications include a variable deep-sleep slotted mode of operation to reduce control communications to the mobile station; and

wherein the mobile station monitors broadcast messages from the base station at a variable periodic rate, less than the first rate in the variable deep-sleep mode of operation.

28. The system of claim 27 wherein the mobile station monitors broadcast messages from the base station at a variable periodic rate, in response to the average traffic communication activity occurring at a differentiated time in the cycle.

29. The system of claim 18 wherein the mobile station includes a battery and a battery condition detector, and wherein control communications between the wireless communication network and the mobile station are reduced in response to the detected battery condition.

30. The system of claim 18 in which a base station includes a message service; and

wherein the base station, following the reducing of the control communications with the mobile station, and in response to the initiation of a mobile station traffic communication, sends a warning from the message center that the initiation of the traffic communication will be delayed.